



MESURED SURVEY OF BLACKWATER QUAY

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STUDENT NO.S

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Introduction

The following comprises of reports that co-incise with measured drawings. Measurements were taken on site, and data has been shared among groups to achieve factual data. The pier and slipway are dated within the 1850s in means of construction. While these structures lack individual documentation in terms of construction methods, through investigative research, construction and materials can be assumed. Each section of this report has reference material to go along with this.

Villierstown Pier

Protection Status

Villierstown pier or quay, is not a protected structure by the Record of Protected Structures, however, it is registered on the National Inventory of Architectural Heritage, to show its cultural value. The river Blackwater is a Special Protection Area. (1)

Structure description

Villierstown Pier, or Quay, is located on the river Blackwater and was constructed in the 1860s, on a rectangular plan using random rubble stone retaining walls topped by a rectangular cut stone. There is a slipway on the North side. The deck surfaced with asphalt. Originally, it served as a ferry crossing point, connecting Villierstown with Camphire house, this being the reason for which there are several metal rings on the topstones, to tie the ferry, or other boats. The structure is not ornamented. (2)

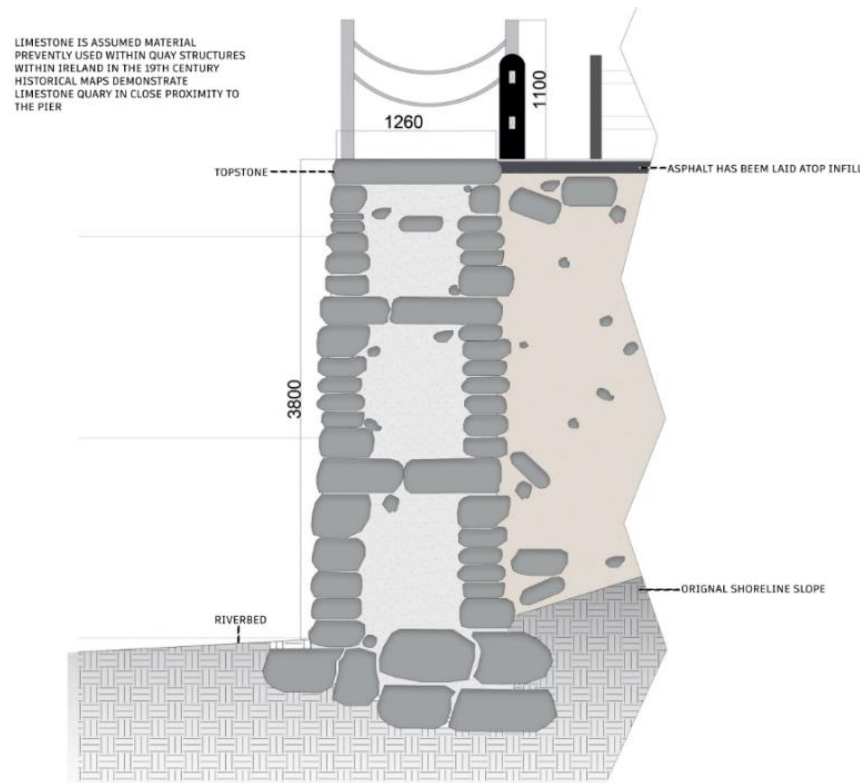


Figure 1: Pier detailed section

1. Site Survey



Figure 2: Site overview (<https://consult.waterfordcouncil.ie/en/system/files/materials/2864/Site%20Overview.pdf>)



Figure 3: Aerial view of the Pier

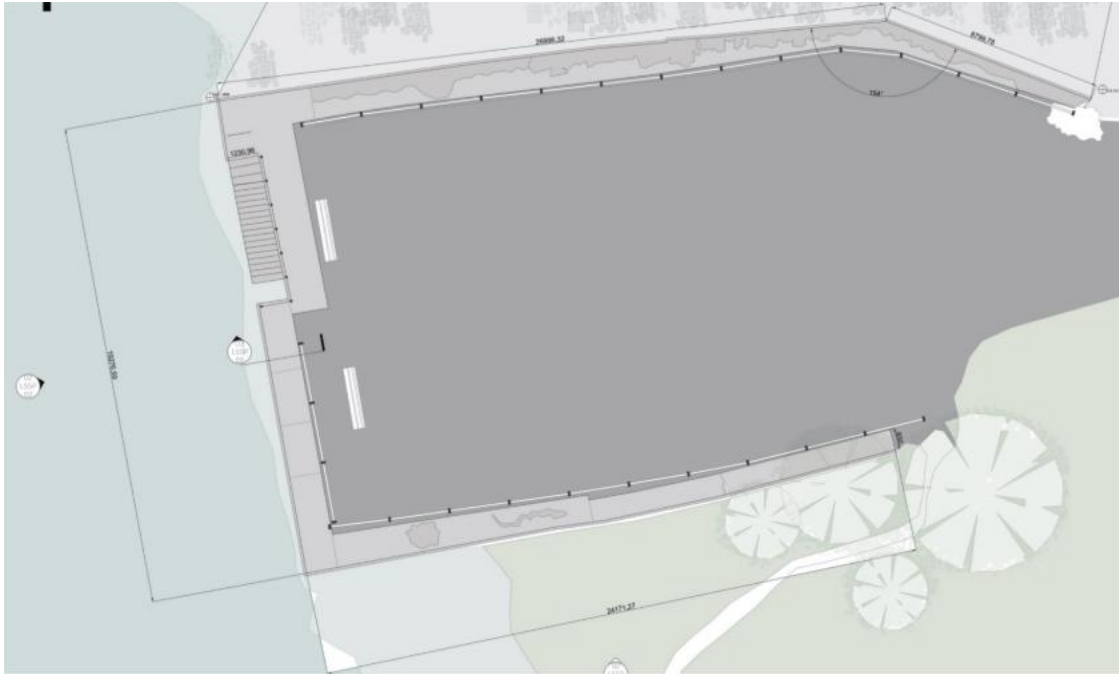


Figure 4: Site plan with measurements

The pier is situated in at the end to the Quay Road coming from Villierstown, also functioning as a car park for visitors. It is next to the Villierstown Boating and Activity Club, which helps keep the use of the river safe and organizes water activities. (1)

The Pier projects into the river, so back in the day boats could dock, or visitors could access the ferry more easily. There is also a flight of cut-stone steps for better access to the river when the tide changed. (3)

The area is well used as the Boating and Activity Club is located adjacent. Nevertheless, materials are eroded, and vegetation is overgrown, these factors could represent a hazard for safety. (1)



Figure 5: Erosion and vegetation overgrowth (<https://irishwaterwayshistory.com/abandoned-or-little-used-irish-waterways/waterways-of-cork-and-kerry/the-bride-the-munster-blackwater-and-the-lismore-canal/the-blackwater-by-road/villierstown/>)



Figure 6: Pier in actuality (<https://consult.waterfordcouncil.ie/en/system/files/materials/2864/AA%20Screening.pdf>)



Figure 7: Docking rings along the Pier (<https://irishwaterwayshistory.com/abandoned-or-little-used-irish-waterways/waterways-of-cork-and-kerry/the-bride-the-munster-blackwater-and-the-lismore-canal/the-blackwater-by-road/villierstown/>)



Figure 8: Steps (<https://irishwaterwayshistory.com/abandoned-or-little-used-irish-waterways/waterways-of-cork-and-kerry/the-bride-the-munster-blackwater-and-the-lismore-canal/the-blackwater-by-road/villierstown/>)

Historical overview

The village of Villierstown was founded in the 1740s by John Villiers, the first Earl of Grandison to accommodate linen weavers from Lurgan Co Armagh. He lived in Dromana House which lies 2 km to the north of the village. The settlement was planned around an Anglian Church, a school, a rectory, a police station and 24 dwellings all constructed from local sandstone. The village was substantially complete by 1750. The historic village is linear with an open space known as the Green located mid-way along the village. This would originally have led to the quay on the River Blackwater 500m to the west.

The Pier, originally served as a ferry crossing point, connecting Villierstown with Camphire house, and was built in 1860. The pier infrastructure uses historical materials such as random rubble stone and construction techniques typical of the mid-19th century. There is quarry close to the quay, from where most likely the stone used was extracted. (4)

We believe that it was constructed using a 'timber caisson', which consist of a timber caisson piles embedded into the ground underwater, and then wooden battens placed between these piles creating a watertight retaining structure. The workspace would always be kept dry by pumping out the water. (5)

Once the space is dry, stones would be placed creating a retaining wall, afterwards the gap would be filled with smaller stone filling and surfaced with stones or asphalt.(5)

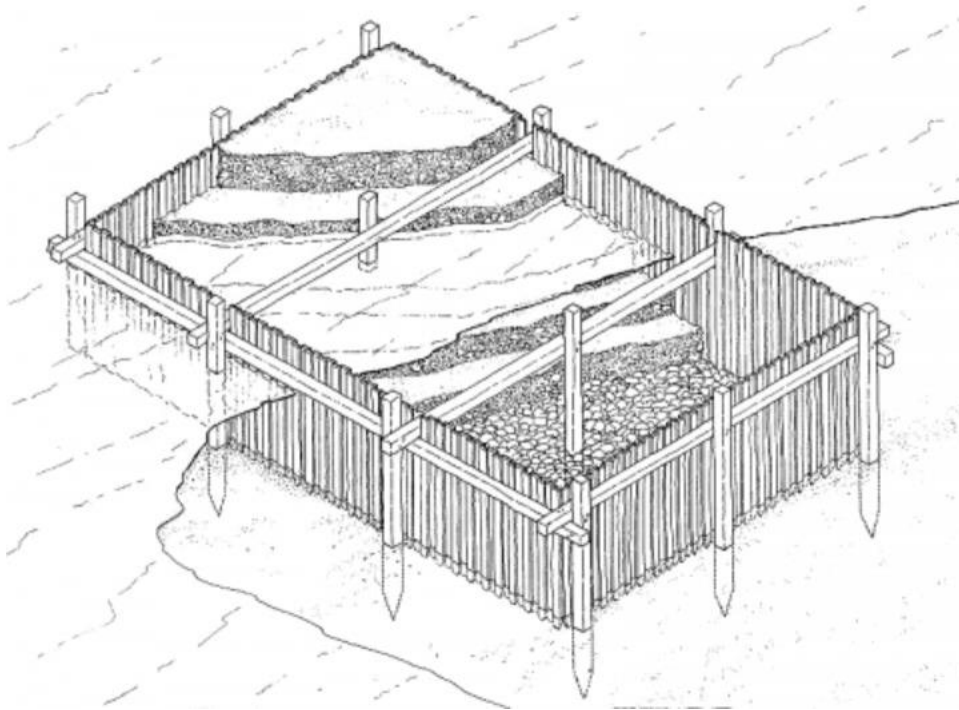


Figure 9: Timber Caisson (https://www.researchgate.net/figure/Timber-caisson-acc-to-Brandon_fig15_339697699)



Figure 10: 6 inch first edition 1829-1834

(<https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=0c9eb9575b544081b0d296436d8f60f8>)

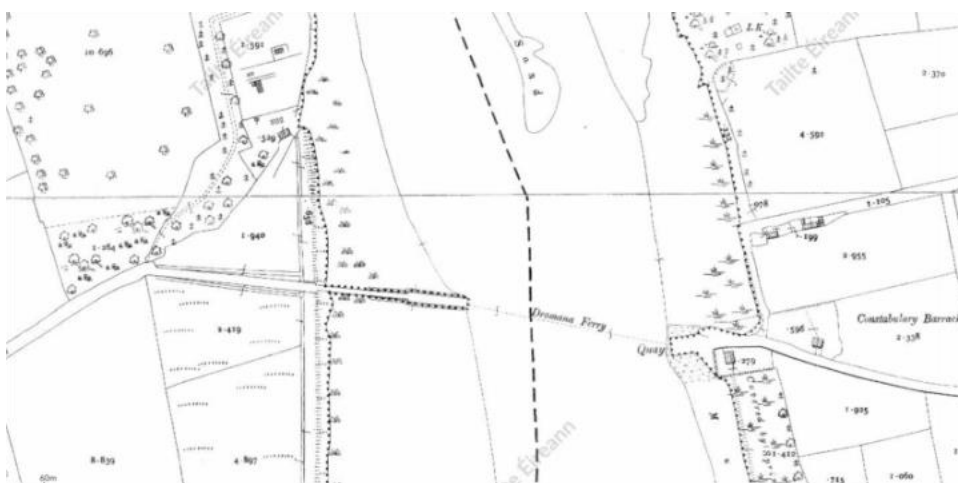


Figure 11: 25 inch edition 1897-1913

(<https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=0c9eb9575b544081b0d296436d8f60f8>)

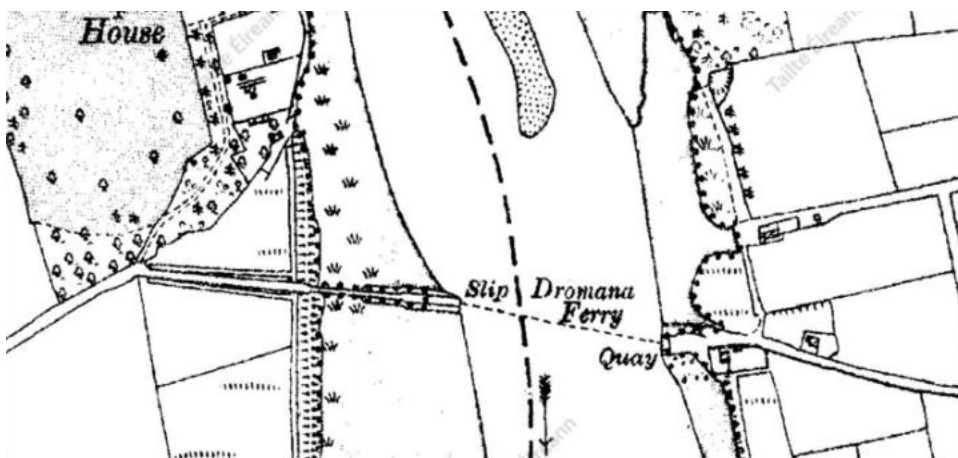


Figure 12: Figure 6: 6 inch last edition 1910-1950

(<https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=0c9eb9575b544081b0d296436d8f60f8>)

Recommendations

The quay is small but active, for that reason some limitations have been identified, as they limit the potential. The limitations include, material erosion, need to resurface the asphalt. Another environmental factor such as the water levels and vegetation overgrowth, also impact the function and the quality of the pier. (1)

The pier is registered on the National Inventory of Architectural heritage, to show its cultural value, however it's not a protected structure. Archaeological assessment recommends monitoring during any ground disturbance to preserve any historical elements. (1)

Technical proposals

- Resurfacing of existing asphalt quay to improve functionality and safety for users.
- Removal of overgrown vegetation on the pier to improve safety
- Resurfacing and maintenance of steps down to the river on the west side of the pier
- Replacement of railings for suitable safety

Slipways along the Blackwater

Materials:

We can assume that the use of asphalt was included in the construction of the slipway, according to Tobin Architects, who stated "it is proposed to resurface the quay with the same surface as currently exists, asphalt" ^[1], as well as the stone that is currently in place along the slipway. The Ecological Impact Assessment of the site also mentions the inclusion of concrete on the slipway: "the site comprises of a concrete quay and slipway" ^[2]. The Waterford Leader Partnership confirms the use of cobblestone in the slipway, stating "the river port at Villierstown has a...cobble slipway" ^[3].

Materials such as fine stone chippings, gravel, concrete cast, aggregate and rubble are used in the slipway construction from the foundation upwards to the surface, as well as other minor materials ^[4]. Sea aggregate mustn't be used in the construction of slipways or other marine structures, as it contains salt which will deteriorate the structure over time. Therefore, we can logically assume that another type of aggregate was used in the construction of the Blackwater slipway.

Aggregate is a material consisting of a mixture of granules, such as sand, gravel, stone and pebbles, used in marine construction in slipways, piers, underwater construction, etc. It can be used near waterways in different locations such as in slipway foundation base layers, as filters, mortar, and as erosion protection, just to name a few. Aggregate is used as a material for load distribution, water resistance and reducing the risk of structural damage.

Cobblestone is used as a material in marine areas because of the lack of environmental impact produced from the stone, it reduces water velocity, permeability- which contributes to run off and reduces the risk of flooding. Cobblestone contributes to a healthy lifecycle of groundwater, aiding to a healthier growth of vegetation and soils. The type of cobblestone used here is a limestone cobble, presumably sourced from the local quarry, used for its high quality and erosion protection. Cobble is also used around waterways for aesthetic purposes, durability and traction.

Construction:

Slipways are generally constructed close to the shore on a foundation of hardcore in either steel, concrete, wood or stone to create an inclined surface to transport water vessels on a winch between the water and land. The earliest example of slipway we have recorded was developed in 1819 by Thomas Morton. He designed slipways "which were generally longitudinal barks of timber, carrying cast-iron rails, laid at any convenient inclination on a foundation of rough stones, of a cradle on rollers with adjustable sliding bilge-blocks" ^[5], on which, the vessels were then loaded onto and originally pulled physically by men, then later winched by mechanical power. Bruce Bell

says that the best foundation to be used for slipways would be solid masonry or concrete base, “rather than being water borne”^[5].

The slipways are to be made of a reinforced slab with a 1:8 gradient to prevent possible damage to the hull of vessels. For a slipway cut into the site, a reinforced concrete raft slab with a 1:12 gradient can be used, extending at least 330mm above the highest water mark. The designs include an edge beam thickening for protection against erosion and scour to prevent deterioration of the slipway over time.

The concrete slab is designed at a shallow gradient to match the shore and is added to allow for easier movements for vessels across the shore when water levels are low.

The use of cobble also doubles as a drainage feature in the Blackwater slipway, as it is a permeable rock and contributes to water percolation. This manages water runoff on the site.

In permanent slipways, the formation levels vary with the foundation where the beam is angled to form the slipway. Foundations of the slipway are to be a minimum of 300mm deep and to be founded on adequate bearing strata, assumed to be very dense sandy gravel. Minimum ground bearing pressure of 200kN/m² from boreholes is to be acknowledged.

A reinforced slab with a textured finish for anti-slip and surface run-off is added as the slipway's final touch.

In the construction of slipways, aggregate is placed in layers of 150mm-300mm and compacted, as a sub-base. As scour protection, aggregate is laid as a filter layer to prevent the erosion of the remaining construction materials in the slipway.

Ballast is a layer of crushed jagged rocks used to take the load of the slipway, vessels and other live loads. Without the ballast, the slipway could sink into the earth beneath. The ballast distributes the pressure and protects the foundation from being damaged under excessive load. Ballast is generally used from dense stone such as basalt or granite in irregular shape in order to stay in place through movements on the slipway.

Another method, which our group has agreed to be an appropriate method for the Blackwater slipway is one reserved for smaller slips. This method involves excavating the site to a 1:8 or 1:12 gradient and compacting the subbase to provide a stable base. Through research, we deem it appropriate that compacted rubble may have been used as a base foundation layer to increase stability and distribute the live and dead loads. We can see the use of mortar between the cobble, to create a smoother ramp surface and to bind the rubble together beneath the ramp. The use of cobble on the slipway may have been to provide a tactile surface to prevent slipping on the wet, inclined surface. There is no obvious edge restraint on the slip for erosion protection.

Current State:



<https://consult.waterfordcouncil.ie/en/system/files/materials/2864/Project%20Description.pdf>. [1]

Fig. 1

Currently the slipway stands as an inclined path from the shore to the land, situated adjacent to the pier and the pontoons on the site, seen in Fig.1. “The cobble slipway allows public access to and from the river and may present a challenge to those familiar with modern smooth slipways.”^[6] as cobble can prove to be difficult to navigate and can be even more difficult in wet conditions, when moss and other vegetation may grow, as well as in cases where users are reliant on walking or mobility supports, like walking sticks, prams or wheelchairs. The slippery moss and mud adjacent to the wall and in between the blocks of cobble can prove to be a hazard for the public as well as those transporting the vessels to and from the water, heightened by the lack of handrail supports.



[Personal Photograph]

Fig. 2

Currently the slipway isn't a protected structure, however adjacent to the slipway, the pier/jetty is protected under the NBHS (detailed in the corresponding report). The slipway was of great

importance historically for docking ferries required to be transported across the Blackwater River and pick up customers and deliver goods to and from Camphire ^[7]. The structure is still in use by locals, visitors and seamen, which is evident from the cobble, grass and mortar being worn down, seen in Fig. 2 & 3.



[Personal Photograph]

Fig. 3

There isn't many notable cracks or fissures in the cobble, however, through constant use over many years, the cobble has lost much of its grip and poses tactile problems for users. The degraded mortar and mud being transferred from the hull of vessels and other vehicles adds to the slip factor on the slipway, seen in Fig. 3.



1837 - 1842



<https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=0c9eb9575b544081b0d296436d8f60f8>]^[7]

1888 – 1913

Reinforcements for Future Developments:

In the future, if the slipway is to be reconstructed on and used regularly, we can guarantee that reinforcements would be needed. Modern constructed slipways consist of reinforcements to withstand the load of vessels from dingies to grand sized boats.

From the average sea-level up to the top of the slipway, the slope should be covered by a cast in one slab, 300mm thick. From the average sea level down to the bottom of the slipway, it should be covered in precast slabs, at least 250mm thick. The precast slabs should not exceed 500 x 500mm and should be laid evenly on the prepared bed of gravel ^[4]. The bottom of the slipway should be protected, against scouring, by either aggregate or jute bags filled with concrete.

The most common type of cement used in Ireland is known as ordinary Portland cement (OPC). The most suitable type of cement for marine works, however, is sulphate-resisting cement (SRC) ^[4].

OPC is created by limestone and clay with gypsum and other granules. It is used for its incredible compressive strength and versatility. Although it has great constructive qualities, it also has notable downsides, for example it releases a high amount of carbon dioxide, contributing to environmental concerns, as well as its higher heat production during the manufacturing stage and higher cost prices.

SRC is a modified form of OPC, used for its non-porous qualities, density and its enhanced resistance to sulphate. SRC has a lowered amount of sulphate ions, which reacts negatively to the salt in the water. This lowered content minimises these chemical reactions, which also minimises the corrosion and deterioration of the concrete when used in saltwater sites. Because of this, SRC is the top cement contender for coastal architecture, underwater structures and sites which include high sulphate contents.

Reinforcing steel is used in concrete to heighten the reinforcing qualities. These steel bars come in diameters ranging from 6mm to 32mm. Marine work steel needs a minimum concrete cover of 50mm for protection against seawater corrosion^[4], preferably using SRC.

* In the case of constructing on softer, marshy grounds, piles would have to be put into the ground to create a stable foundation. They're constructed on soils that are common in sites where slipways are built, on soft compressible soils, in order to produce a deep support for the slipway. They're also used to support high bearing live and dead loads. Pile foundations are also best suited for water conditions and don't react poorly with saltwater. Piles such as bored piles, screw piles or driven piles are seen in slipway construction. Although they are ideal for underwater construction, they still need to be protected using special epoxy paints if steel, SRC if concrete, or particular oils if timber to avoid deterioration^[4]. During the first construction of slipways, timber platforms were sufficient for smaller slipways, however for larger ones, Morton confirmed the use of robust frameworks and pilings is essential^[5].

On our site, there is a notable lack of safety features on the slipway. Features such as tactile paving materials and handrails would be of use for those accessing the river for recreational use.

The Eurocode EN 1992 is provided for the design of concrete structures, including for slipways. It includes sections on reinforcements, erosion control and maintenance that should be adhered to if considering using the slipway in the future, due to saltwater erosion and wear and tear over time. It is also important to note that the construction of slipways must comply with the building regulations (Part M, D, A), OPW, WFD and in our case, referring to the SPA/SAC and NPWS directives, for legal compliance, maintenance and safety and environmental and erosion protection.

Pontoon

Protection Status:

Protection status Villierstown Jetty (River Blackwater, Co. Waterford)

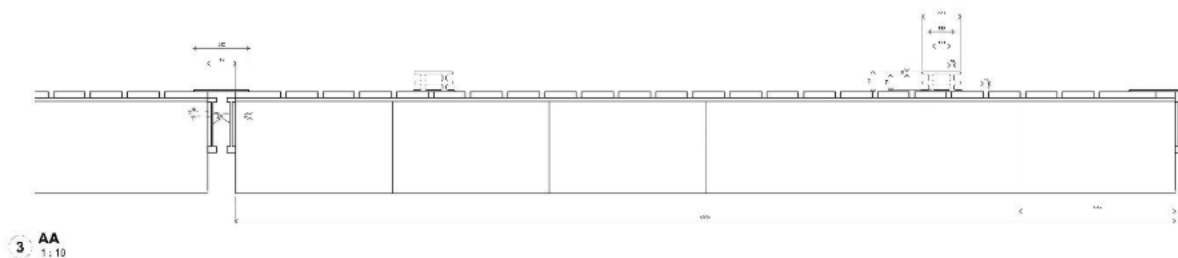
The site is located within the Villierstown Architectural Conservation Area (ACA), which means that even though the jetty is not individually protected, the appearance of the surrounding area must be preserved. Defined by the Waterford City & County Council (WCCC) Development Plan 2022-2028. Villierstown Quay (c.1860) is listed in the NIAH (ref. 22819013) National Inventory of Architectural Heritage but is not a Protected Structure; the pontoon itself does not have any individual protection status. The site is included in the Blackwater River (Cork/Waterford) SAC 002170; the nearby Special Protection Areas (SPAs) (Blackwater Estuary, Blackwater Callows, Dungarvan Harbour) have no hydrological connection relevant to the proposed works. The Appropriate Assessment Screening concludes that there will be no significant effects and does not require a Natura Impact Statement. Any intervention on the foreshore is subject to licensing by the Maritime Area Regulatory Authority (MARA).

Structure

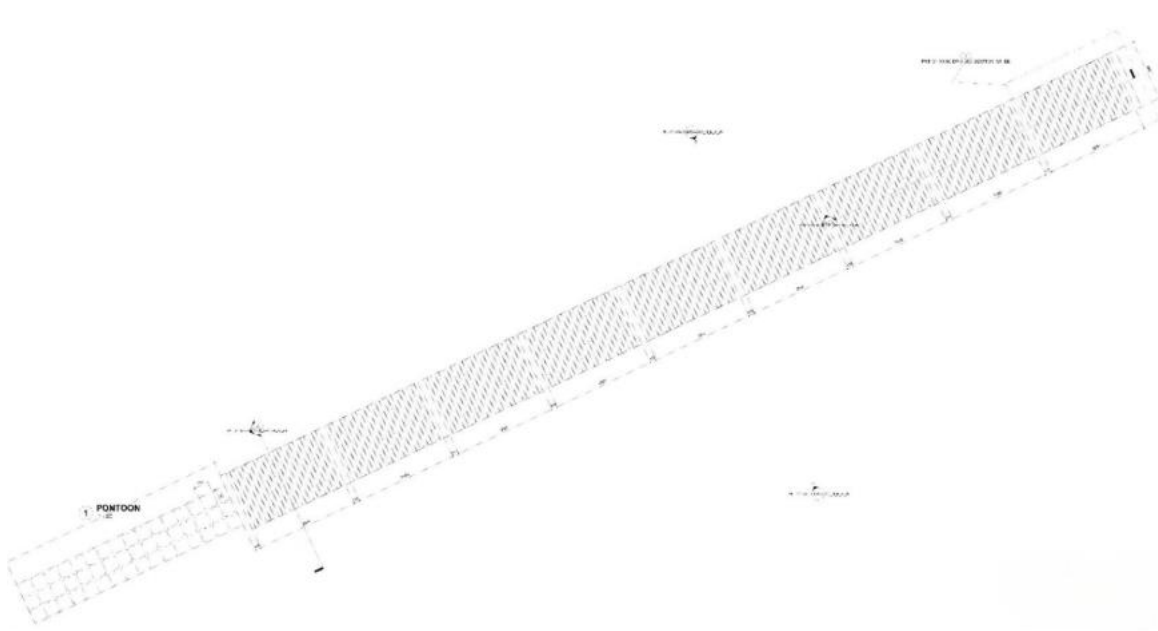
The structure consists of galvanized steel I-beams (50 lx310l) welded together to form a frame 3000mm wide and 5000mm long. Four other beams are placed lengthwise to form five bays 540mm wide. Barrels (540 x 540 x 885) are embedded in the bays, five widthwise and six lengthwise. Wooden floorboard (35 mm high) is placed with anodized screws (50 mm high) screwed in from below through the beams and from above with screws (40 mm high). Stainless steel cover plates are placed over the joints between the frames. This constitutes one module; the entire pontoon is made of nine modules with the steel cover plate as a visual separation.

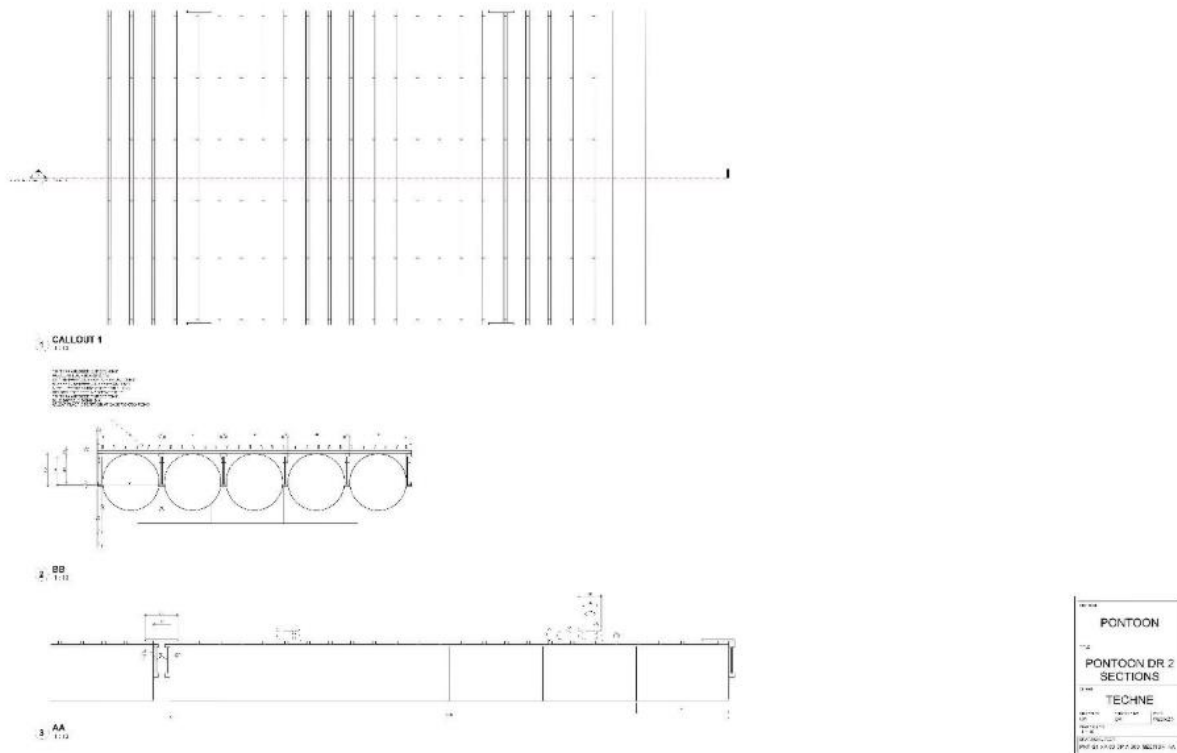
In addition, a floating pontoon extension made of 700x700x700mm cubic modules. Dig into the corners to form a loop that serves as an attachment. When the modules are placed side by side, the corner loops overlap, and a stake is placed in the center to connect them together.

Materials: T30 TORX ANODIZED SCREWS 40MM - WOODEN FLOORBOARD 35MM - SS IN BETWEEN COVER PLATE (FRONT) 10MM - RUBBER IN BETWEEN COVER (BACK) 10MM

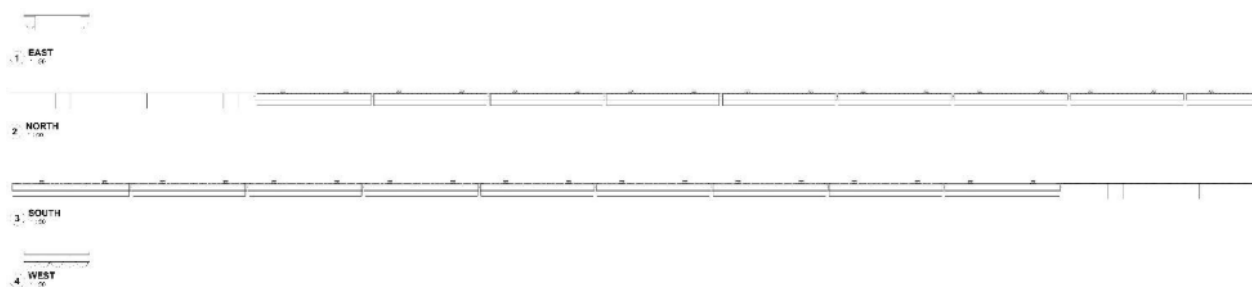


Current state





The pontoon is located on the Villierstown Quayside. This site is one of many points of interest for residents living around the Blackwater River. The pontoon is accompanied by two other structures on the quayside. The slipway and the piers, the pontoon is used to coast boats at high tide. At low tide, it rests on the ground with the boats and therefore follows the slope of the slipway. The pontoon differs from the other two structures in that it is more fragile. As it is made of more fragile materials, its deterioration over time is much more visible than that of the slipway and the Piers. It will therefore have to undergo more changes and be replaced regularly in view of the age of the quays.



Elevation, Pontoon

Photographs



Villierstown quay, Pontoon



Villierstown quay, Pontoon.

As we can see the wood is in a constant degradation state due to weather conditions and its conditions of use. The current size allows only small sized boats to coast on.



Villierstown quay, boats

Historical account

Villierstown Quay is part of the industrial and river history of Blackwater. Villierstown was founded in the 16th century, and the site has long served as a crossing point and landing stage on the river. The current quay dates from around 1860 and is listed in the National Inventory of Architectural Heritage (NIAH ref. 22819013). In recent times, the growth of local water sports (creation of the Villierstown Boathouse ten years ago, in 2014) has been supported by a floating pontoon, now considered 'more suitable' to replace to improve access (kayaks, canoes, small boats). The pontoon is the most recent addition to the quays. The exact date of its addition is unknown, but historical imagery suggests that it dates from 2006 and 2013. Furthermore, due to the recent appearance of the pontoon and the fact that it is most likely prefabricated, it is difficult to trace the origin of its materials. The fact that the pontoon is recent means that it has not had any impact on the quays for most of their existence. As the area is protected (see protection status), it cannot and must not impose itself too visibly on the landscape, and its mobility is an advantage in this aspect



GeoHive map, Villierstown Quay, 2006

Geohive map, Villierstown Quay, 2013



Recommendation

As a recommendation, we could consider modernizing the pontoon, which is showing signs of relatively advanced deterioration. Replacing the pontoon should ensure that it remains easy to dismantle and has a low visual impact on the landscape. The objective would be to find a compromise between the size and capacity of the pontoon to optimize users' nautical activities while avoiding any distortion of the river's natural character.

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PONTOON

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